PROCEEDINGS

OF

THE ROYAL SOCIETY.

1839. No. 41.

December 5, 1839.

FRANCIS BAILY, Esq., V.P., in the Chair.

John Rogers, Jun., Esq. was balloted for, and duly elected into the Society.

No paper read.

December 12, 1839.

MAJOR SABINE, R.A., V.P., in the Chair.

George Leith Roupell, M.D., was balloted for, and duly elected into the Society.

"On the Nerves of the Gravid Uterus." By Robert Lee, M.D., F.R.S.

The author, while dissecting a gravid uterus of seven months, on the 8th of April, 1838, observed the trunk of a large nerve proceeding upwards from the cervix to the body of that organ along with the right uterine vein, and sending off branches to the posterior surface of the uterus; some of which accompanied the vein, and others appeared to be inserted into the peritoneum. A broad band, resembling a plexus of nerves, was seen extending across the posterior surface of the uterus, and covering the nerve about midway from the fundus to the cervix. On the left side, a large plexus of nerves was seen, surrounding the uterine veins at the place where they were about to enter the hypogastric vein. From this plexus three large trunks of nerves were seen accompanying the uterine vein, which increased in size as they ascended to the fundus uteri. From the nerve situated on the posterior surface of the vein, numerous filaments passed off towards the mesial line, as on the right side; some following the smaller veins on the posterior surface of the uterus, and others becoming intimately adherent to the peritoneum. The largest of the nerves which accompanied the uterine vein was traced as high as the part where the Fallopian tube enters the uterus; and there it divided into numerous filaments, which plunged deep into the muscular coat of the uterus along with the vein. A large fasciculated band, like a plexus of nerves, was also seen on the left side under the peritoneum, crossing the body of the uterus; and several branches, apparently nervous, proceeding from this band, were distinctly continuous with some of the smaller branches of nerves accompanying the uterine veins. The preparation of the parts was placed in the Museum of St. George's Hospital, on the 1st of October, 1838; and several anatomists who examined it were of opinion that they were absorbents accompanying the uterine veins, and tendinous fibres spread across the posterior surface.

Dr. Lee availed himself of another opportunity which presented itself, on the 18th of December of the same year, of examining a gravid uterus in the sixth month of pregnancy, which had the spermatic, hypogastric and sacral nerves remaining connected with it; and during the last ten months, he has been diligently occupied in tracing the nerves of this uterus. He believes that he has ascertained that the principal trunks of the hypogastric nerves accompany, not the arteries of the uterus, as all anatomists have represented, but the veins; that these nerves become greatly enlarged during pregnancy; and that their branches are actually incorporated, or coalesce with the branches of the four great fasciculated bands on the anterior and posterior surface of the uterus, bearing a striking resemblance to ganglionic plexuses of nerves, and sending numerous branches to the muscular coat of the uterus.

The author gives the following description of the nerves of the gravid uterus in the sixth month, and of these fasciculated bands as displayed in the dissection.

Behind the uterus, the aortic plexus divides into two portions, to form the right and left hypogastric plexuses. These plexuses, after an intimate union with the nerves accompanying the ureters, descend to the neck of the uterus, upper part of the vagina, and contiguous parts of the bladder and rectum, where they are joined by branches from the third and fourth sacral nerves. The left hypogastric plexus, about two inches below the aortic plexus, sends off a large branch, which passes on the inside of the ureter to the superior uterine vein, where it is about to terminate in the hypogastric vein. Here the nerve suddenly expands, becomes broad and thin, and passes into a great plexus of nerves, which completely encircles the vein. This plexus, surrounding the uterine vein, is joined below by two large branches, which proceed from the hypogastric plexus nearer the vagina, and lower down, and from which branches pass on the outside of the ureter. From the upper part of this plexus, surrounding the uterine vein near its termination, three large trunks of nerves proceed upwards with the vein to the superior part of the uterus, and enlarge as they ascend. The posterior branch of these hypogastric nerves sends off in its course smaller branches, which accompany the ramifications of the uterine vein on the posterior surface of the uterus. Passing upwards beyond the junction of the spermatic with the uterine vein, and running between the peritoneum and the left posterior fasciculated band, it spreads out into a web of thin broad branches and slender nervous filaments, some of which are inserted into the peritoneum, and others follow the vein to the fundus uteri, which they completely surround as the vein passes down into the muscular coat of the uterus.

Some of the branches of this nerve, near the fundus uteri, are distributed to the muscular coat, but these are small and few in number.

The middle and anterior branches of the hypogastric nerves adhere closely to the uterine vein as they ascend, and form around it several plexuses, which completely invest the vessel. From these plexuses branches are sent off to the anterior surface of the uterus, some of which, in an arborescent form, follow the trunk and branches of the uterine artery. These two hypogastric nerves ascend, and closely unite with the left posterior fasciculated band.

On the left side of the uterus this band arises near the mesial line, on the back of the uterus, midway between the fundus and cervix, from a mass of fibres, which adhere so firmly both to the peritoneum and muscular coat that it is difficult precisely to determine their arrangement. From these fibres the band proceeds across the uterus, in the form of a thin web, to the point where the spermatic vein is leaving the uterus. After closely uniting with the hypogastric nerves, this band proceeds outwards to the round ligament, becoming less firmly adherent to the peritoneum, where it unites with the left anterior band, and spreads out into a great web, under the peritoneum. The left posterior band is loosely attached, through its whole course, to the subjacent muscular coat by soft cellular membrane.

The spermatic nerves on the left side pass down to the ovarium with the spermatic artery, and first give off several branches to the corpus fimbriatum. A few small branches are then sent into the outer end of the ovary. The spermatic nerves afterwards leave the artery, and proceed with the veins to the uterus, where they firmly unite to the outer extremity of the left posterior band; and after the junction of this band with the prolongations of the anterior band under the round ligament, numerous small, delicate filaments, apparently nervous, are sent to the base of the ovarium.

On the right side of the uterus, the author finds that the distribution of the hypogastric and spermatic nerves does not essentially differ from that now described as seen on the left side. The form and situation of the right posterior band is, he states, much more clearly seen than on the left side, and presents the appearance of a white pearly fasciculated membrane about a quarter of an inch in breadth, proceeding from the mesial line at right angles to the hypogastric nerves, across the body of the uterus, to the round ligament, where it unites with the anterior band. Numerous branches, strikingly resembling the branches of nerves, are sent off from the upper and lower edges of this band, and from its posterior surface to the muscular coat of the uterus. An extensive and intimate union at various points is distinctly perceptible between these branches sent off from the band and the branches of the hypogastric nerves. On the anterior and upper part of the neck of the uterus, there is a great mass of reddish-coloured fibres, firmly interlaced together, resembling a ganglion of nerves, into which numerous large branches of the hypogastric nerves on both sides enter, and to which they firmly adhere. From the upper part of this fibrous substance there passes up, over the whole anterior surface of the uterus, a thin band of firm white fasciculated fibres, prolongations of which extend to the round ligaments,—into which, and into the posterior band, they are continued by numerous filaments, like those of nerves. From the posterior surface of this great band, numerous branches, also apparently nervous, can be traced to a considerable depth through the muscular coat of the uterus.

The author concludes his paper with the following remark, and a short historical account of the progress of discovery on the subject of the nerves of the uterus:—

"From the form, colour and general appearance of these fasciculated bands, and the resemblance they bear to ganglionic plexuses of nerves, and from their branches actually coalescing with the hypogastric and spermatic nerves, I was induced to conclude, on first discovering them, that they were nervous plexuses, and constituted the special nervous system of the uterus. The recent examination, however, of the gravid uterus of some of the lower animals, in which I have found a structure similar to those bands in large quantity under the peritoneum, has left me in considerable doubt as to the nature of these bands, and until further investigations have been made, I shall not venture to pronounce a positive opinion respecting them."

The description of the nerves of the uterus contained in Professor Tiedemann's splendid work, the author adds, is usually referred to by anatomical writers as the most accurate and complete which has ever been given. Professor Tiedemann has represented the spermatic nerves as being distributed chiefly to the ovarium; and the hypogastric as invariably accompanying the trunk and branches of the uterine arteries, along the sides of the uterus,—dividing into smaller branches, and quickly disappearing in the muscular coat of the uterus. He has made no mention of the large nervous trunks on both sides of the uterus, which accompany the uterine veins; nor has he noticed fasciculated transverse bands on the anterior and posterior surfaces of the uterus, connected with the hypogastric and spermatic nerves.

"Observations made at the Cape of Good Hope, in the year 1838, with Bradley's Zenith Sector, for the verification of the amplitude of the Abbé de la Caille's Arc of the Meridian; by order of the Lords Commissioners of the Admiralty." By Thomas Maclear, Esq., M.A., F.R.S., &c. Communicated by Sir John Barrow, Bart., V.P.R.S., &c.

The author gives an account of the precautions taken in putting together the different parts of the zenith sector, which he received on the 9th of December, 1837, in erecting it in the central room of the Royal Observatory at the Cape of Good Hope, and in afterwards transferring it to the southern station of La Caille, in Cape Town. He then proceeds to the [illegible] La Caille's observatory, and the particular circumstances of its locality, with relation to the object in view, namely to determine the influence of Table Mountain on the direction of the plumb-line. He next relates his progress to Klyp Fonteyn, where he arrived on the 24th of March, 1838, and describes the operations resorted to for erecting the sector at that place. He then enters into the details of observations made at different stations, and especially with comparative observations at the summit and foot of the mountain of Pequet Berg. The instrument was lastly conveyed back to Cape Town, and again examined, and the observations made with it repeated. The reduction of the observations occupies the remainder of the paper; and in conclusion, the author remarks, that although these labours have not altogether cleared up the anomaly of La Caille's arc, yet they show that great credit is due to that distinguished astronomer, who with imperfect means, and at the period in which he lived, arrived at a result, derived from sixteen stars, almost identical with that from 1139 observations on forty stars, made with a celebrated and powerful instrument.

December 19, 1839.

MAJOR SABINE, R.A., V.P., in the Chair.

Henry Drummond, Esq., was duly elected a Fellow of the Society.

A paper was read, entitled, "An account of experiments made with the view of ascertaining the possibility of obtaining a spark before the circuit of the Voltaic Battery is completed." By J. P. Gassiot, Esq.

The author of this paper adverts to the fact, of a spark invariably appearing when the circuit of the Voltaic Battery is completed; an effect which Dr. Faraday has shown can be easily produced, even with a single series. He then refers to the experiments of Mr. Children, Sir Humphry Davy, and Professor Daniell, recorded in the Philosophical Transactions; in which experiments, when more powerful and extended series were used, the spark was obtained before contact took place.

In order to ascertain, not only the fact of a spark being obtained, but also the distance through which it may be passed, the author had an instrument prepared, which he denominates a *Micrometer Electrometer*, and by which an appreciable space of one five-thousandth of an inch could be measured with great accuracy. He describes this instrument; and relates several experiments which he made with a view to test the correctness of its action. He first prepared 160, and then 320 series of the constant battery, in half-pint porcelain cells, excited with solutions of sulphate of copper and muriate of soda; but although the effects, after the contact had been completed, were exceedingly brilliant, not the slightest spark could be obtained. He was equally unsuccessful with a water battery of 150 series, each series being placed in a quart glass vessel;

and also with a water battery belonging to Professor Daniell, consisting of 1020 series; but when a Leyden battery of nine jars was introduced into the circuit of the latter, sparks passed to the extent, in one instance, of six five-thousandths of an inch.

The author mentions his having been present at the experiment of Professor Daniell, on the 16th of February, 1839, when that gentleman had 70 series of his large constant battery in action; and having been witness of the powerful effects obtained by this apparatus, he was induced to prepare 100 series of precisely the same dimensions, and similarly excited: but although this powerful apparatus was used under every advantage, and the other effects produced were in every respect in accordance with the extent of the elements employed, still no spark could be obtained until the circuit was completed; *even a single fold* of a silk handkerchief, or a piece of dry tissue paper, was sufficient to insulate the power of a battery, which, after the circuit had been once completed, fused titanium, and heated 16 feet 4 inches of No. 20 platinum wire.

The author then describes a series of experiments made with induced currents. Twelve hundred and twenty iron wires, each insulated by resin, were bent into the form of a horse-shoe. A primary wire of 115 feet and a secondary of 2268 feet, were wound round the iron wires. With this arrangement he obtained a direct spark (through the secondary current), sufficient to pierce paper, to charge a Leyden jar, &c. Several forms of apparatus employed by the author are next described, and also a series of 10,000 of Jacubone's piles. With this arrangement he charged a Leyden battery to a considerable degree of intensity, and obtained direct sparks of three-fiftieths of an inch in length. He ultimately succeeded in obtaining chemical decompositions of a solution of iodine and potassium, the iodine appearing at the end composed of the black oxide of manganese.

The Society then adjourned over the Christmas Vacation, to meet again on the 9th of January, 1840.

January 9, 1840.

JOHN WILLIAM LUBBOCK, Esq., V.P. and Treasurer, in the Chair.

John Augustus Lloyd, Esq., who, at the last Anniversary, had ceased to be a Fellow, from the non-payment of his annual contribution, was at this meeting re-admitted by ballot into the Society, agreeably to the provision of the Statutes.

James Whatman, Jun., Esq., M.A., was balloted for, and duly elected into the Society.

A paper was read, entitled, "On the construction and use of Single Achromatic Eye-Pieces, and their superiority to the double eye-piece of Huyghens." By the Rev. J. B. Reade, M.A., F.R.S.

The author observes, that experience has shown it to be impracticable to make a telescope even approach to achromatism, by employing the same object-glass with an astronomical, as with a terrestrial eye-piece: for if the focus of the blue rays from the object-glass be thrown forwards, as it must be in order to make it impinge upon the focus of the blue rays of the terrestrial eye-glass, then there will be produced a great *over-correction* for the astronomical eye-glass; and *vice versa*. Hence it appears that the application of Huyghenian eye-pieces to refracting telescopes, is incompatible with the conditions of achromatism, throughout the entire range of magnifying power; and that in reflecting telescopes they unavoidably introduce dispersion, because they are not in themselves achromatic. These defects the author proposes wholly to obviate, by substituting for the Huyghenian eye-pieces, single achromatic lenses of corresponding magnifying power; consisting of the well-known combination of the crown-lens, and its correcting flint-lens, having their adjacent surfaces cemented together; thus avoiding internal reflections, and enabling them to act as a single lens. The achromatic eye-pieces which he uses were made by Messrs. Tulley and Ross, and are of the description usually termed *single cemented triples.*

A paper was also read, entitled, "Meteorological Observations made between October, 1837, and April, 1839, at Alten in Finmarken." By Mr. S. H. Thomas, chief mining agent at the Alten Copper Works. Presented to the Royal Society by John R. Crowe, Esq., Her Britannic Majesty's Consul at Finmarken. Communicated by Major Edward Sabine, R.A., V.P.R.S.

This memoir consists of tables of daily observations of the barometer and thermometer, taken at 9 A.M., 2 P.M., and 9 P.M., with remarks on the state of the weather, at Kaafjord, in latitude 69° 58′ 3″ north, and longitude 23° 43′ 10″ east of Paris.

January 16, 1840.

JOHN WILLIAM LUBBOCK, Esq., V.P. and Treasurer, in the Chair.

A paper was read, entitled, "On Nobili's Plate of Colours; in a Letter from J. P. Gassiot, Esq., addressed to J. W. Lubbock, Esq., V.P. and Treasurer R.S." Communicated by J. W. Lubbock, Esq.

The effect produced by the late Signor Nobili, of inducing colours on a steel plate, excited the curiosity of the author, and led him to the invention of the following method of producing similar effects. Two of Professor Daniell's large constant cells were excited with the usual solutions of sulphate of copper and sulphuric acid. A highly-polished steel plate was placed in a porcelain soup-plate, and a filtered solution of acetate of lead poured upon it. A piece of card-board, out of which the required figures had been previously cut with a sharp knife, was then placed upon a steel-plate. Over the card, and resting on it, there was fixed a ring of wood, a quarter of an inch thick, and the inner circumference of which was of the same size as the figure. A convex copper-plate was made so that its outer edge might rest on the inner part of the wooden ring; and its centre placed near, but not in actual contact with the card-board. Connexion was then made by the positive electrode of the battery with the steel-plate; the negative being placed in the centre of the copper convex plate. The figure was generally obtained in from 15 to 35 seconds. If a concave, instead of a convex plate be used, the same colours are obtained as in the former experiment, but in an inverse order.

" Geographical position of the principal points of the Triangulations of the Californias and of the Mexican coasts of the Pacific, with the heights of the principal points of that part of the Cordilleras." By the Comte Vincent Piccolomini; in a letter addressed to Sir John F. W. Herschel, Bart., V.P.R.S. Communicated by Sir John Herschel.

Hauteurs des principaux points des Cordilleres, des côtes de l'Océan Pacifique du Mexique, et de la haute et basse Californie.

	Elévation en pieds français sur le niveau de la mer pacifique.
Volcano di Orizaba	18728
Volcano di Popocatepetl.	17812
Volcano di Tztlacihuatl	15698
Rio frio	10948
Real del Monte	10570
El oro	8995
Tlalpuhahua	8435
Ameia	8247
Naupalucan	8194
Las Vigas	7918
Perote	7911
Ozumba (Etat de Puebla)	7874
Tepeyahualco	7702
Ozumba (Etat de Mexico)	7620
S. Rosa	7565
Lagunas de Chalco	7510
Mexico	7450
Tepeaca	7444
Huehuetaca	7121
Puebla	7078
Tula	6613
Tlacotepec	6479
Zacualpan	6181
Tasco	5971
Temascaltepec	5760
Guernavaia	5447
Tchuacan	5398
Xantetelco	5030
Cuicatlan	5028
Oajaca	5024
Cuautla	4587
Talapa	4542
Acayucan	4485
Coscomatepec	4451
Huatusco	4424
Talostoc	4421
Lautepec	4019
Orizaba (ville)	3998
Real de Christo	3851
Huaitla	3336
Cordova	2769
Dominguillo	2274
Villalé	1578
Petapa	617
Tehuantepec (Océan Pacifique.)	132

Position géographique des principaux points de la Triangulation des Californies et des côtes de l'Océan Pacifique du Mexique par le Comte Vincent Piccolomini.

	Latitude.			Longitude calculée de Greenwich.		
	°	′	″	°	′	″
Volianos de las Virgenes	29	91	14·35	121	46	30·82
Cap S. Lucas (Basse californie)	23	08	35·27	109	82	15·04
Monterrey (Haute californie)	36	58	17·85	121	46	53·09
Guaymas (Département de Sonora)	27	55	00·48	111	45	37·42
Matamoros (Texas)	25	59	22·07	97	54	18·76
Id. Id. Barra grande de S. Yayo	26	30	27·15	...	...	......
Id. Id. Barra del Rio	25	53	03·11	...	...	......
Bejar (Texas)	29	74	88·93	98	85	17·74
Mine d'or de S. Yago de los Cabálleros	25	13	77·04	106	67	15·87
Vulians de Tuxtla	18	47	25·91	94	07	43·11
Namampateptl (Province de Vera Cruz)	19	21	48·71			
Bahia de San Francesco (au cap los Reyex dans la haute Californie)	37	59	17·29	122	37	13·04
Port de San Blas, tour de l'église (guadalajara)	21	67	05·54	105	43	17·28
Volcanos de Colima	19	03	45·17	103	21	47·04

N.B. L'instrument employé pour déterminer les Longitudes était un Chronomètre de O. H. Bestor; pour la mesure des triangles de prémier ordre je me servis d'un théodolite de dix pouces de diamètre sortant des ateliers de Munchi, pourvu de quatre verniers et donnant 10″. Les élévations du sol furent déterminées par des observations barométriques faites avec soin, souvent répetées et déduites par le moyen d'observations correspondants; elles furent calculées d'après la méthode d'Oltmanns et vérifieés par celles du Baron Zach. —V.P.

"Report on the co-operation of the Russian and German observers, in a system of simultaneous Magnetical Observations." By the Rev. H. Lloyd, F.R.S., in a letter addressed to Sir John F. W. Herschel, Bart., V.P.R.S. Communicated by Sir John Herschel.

"On Magnetical Observations in Germany, Norway, and Russia." By Major Sabine, R.A., V.P.R.S., in a letter to Baron von Humboldt, For. Mem. R.S., dated Oct. 24th, 1839.

These letters relate to communications which Professor Lloyd and Major Sabine have had, conformably to a resolution of the Council of the Royal Society, with the scientific authorities at Göttingen, Berlin, and St. Petersburg, respecting the organization of a simultaneous system of magnetical observations. It appears, from these letters, that the system proposed by the Royal Society is viewed with general interest and approbation; and nineteen stations are enumerated at which there is reason to expect that magnetical observatories, acting in concert, on that system, will be established.

January 23, 1840.

Sir JOHN BARROW, Bart., V.P., in the Chair.

John Pye Smith, D.D. was balloted for, and duly elected into the Society.

A paper was read, entitled "On the structure of Normal and Adventitious Bone." By Alfred Smee, Esq., communicated by P. M. Roget, M.D. Sec. R.S.

On examining, by means of a microscope, very thin sections of bone, prepared in a peculiar manner, the author observed a number of small, irregularly-shaped, oblong corpuscles, arranged in circular layers round the canals of Havers, and also rows of similar bodies distributed around both the external and the internal margins of the bone. Each corpuscle is connected by numerous filaments, passing in all directions with the Haversian canals and the margins of the bone, and also with the adjacent corpuscles. He finds that the canals of Havers are vascular tubes containing blood. The corpuscles themselves are hollow, and their cavities occasionally communicate with those of the canals; their length is equal to about two or three diameters of the globules of the blood. They exist in cartilaginous as well as osseous structures, and are found in every instance of adventitious bone, such as callus after fracture, morbid ossific growths either from bone or from other tissues; and the author has also ascertained their presence in the bony and cartilaginous structures of inferior animals, such as birds and fishes. Measurements relating to these corpuscles, by Mr. Bowerbank, are subjoined, from which it appears that their diameters vary from about the 10,000th to the 4000th, and their lengths from the 2300th to the 1400th part of an inch.

"An attempt to establish a new and general Notation, applicable to the doctrine of Life Contingencies." By Peter Hardy, Esq., F.R.S.

After premising a short account of the labours of preceding writers, with reference to a system of notation in the mathematical consideration of life contingencies, the author enters at length into an exposition of the system of symbols which he has himself devised, together with the applications which they admit of in a variety of cases.

January 30, 1840.

JOHN WILLIAM LUBBOCK, Esq., V.P. and Treasurer, in the Chair.

James Annesley, Esq., was balloted for, and duly elected into the Society.

A paper was read, entitled "Observations on Single Vision with two Eyes." By T. Wharton Jones, Esq. Communicated by Richard Owen, Esq., F.R.S.

The author animadverts on the doctrine which Mr. Wheatstone, in his paper on the Physiology of Binocular vision, published in the Philosophical Transactions for 1838, p. 371, has advanced, in opposition to the received theory of single vision being dependent on the images of objects falling on corresponding points of the two retinæ. He maintains that, under these circumstances, the two impressions are not perceived by the mind at the same instant of time, but sometimes the one and sometimes the other. If one impression be much stronger than the other, the former predominates over, or even excludes the other; but still the appearance resulting from the predominating image is nevertheless in some manner influenced by that which is not perceived. He supposes that there are compartments of the two retinæ, having certain limits, of which any one point or papilla of the one corresponds with any one point of the other, so that impressions on them are not perceived separately; and considers that this hypothesis, combined with the principle above stated, is required, in order to explain the phenomena in question.

February 6, 1840.

JOHN WILLIAM LUBBOCK, Esq., V.P. and Treasurer, in the Chair.

John Parkinson, Esq. and the Rev. Charles Pritchard, M.A. were balloted for, and declared duly elected into the Society.

A paper was read, entitled "Observations on the Blood-corpuscles of certain species of the Genus Cervus." By George Gulliver, Esq., F.R.S., Assistant Surgeon to the Royal Regiment of Horse Guards.

The author has found that the blood of the Muntjac*, the Porcine†, and the Mexican Deer‡, contains, together with corpuscles of the ordinary circular form, a still larger number of particles of less regular shape; some curved and gibbous in the middle, and acutely pointed at the ends, with a concave and convex margin, like a crescent; others approaching more nearly to segments of a circle; some shaped like a comma, being obtuse at one end and terminated by a pointed curve at the other; others having an acute projection of the convex part, so as to constitute a triangular, or even quadrangular outline; some having the figure of the head of a lance; while a few presented a double or sigmoid flexure, as if they had been twisted half round at the middle. Like the ordinary blood-discs, these peculiar corpuscles are deprived of their colouring matter by water; but with only a small quantity of water they quickly swell out, and assume an oval or circular figure, forming long bead-like strings by the approximation of their edges. In saline solutions they become rather smaller, but preserve their figure tolerably well.

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* *Cervus Reevesii.* † *C. Porcinus.* ‡ *C. Mexicanus.*

In an appendix, the author gives an account of his observations of the blood-corpuscles of a new species of Deer inhabiting the mountains of Persia, of which a specimen has been lately received by the Zoological Society. Many of these corpuscles presented the singular forms above described.

A paper was also read, entitled "Meteorological Register kept at Port Arthur, Van Diemen's Land, during the year 1838." By Deputy-Assistant Commissary-General Lempriere, in south latitude 43° 9′ 6″, and east longitude 147° 51′ 33″. Communicated by Captain Beaufort, R.N., F.R.S.

The height of the instrument above the level of the sea till the 21st of August was 57 feet, 7 inches; and during the remainder of the year 3 feet.

A paper was also in part read, entitled "Experimental Researches in Electricity, 16th Series." By Michael Faraday, Esq., D.C.L., F.R.S., &c.

February 13, 1840.

The MARQUIS of NORTHAMPTON, President, in the Chair.

Martin Barry, M.D. and Joseph Phillimore, LL.D., were balloted for, and duly elected into the Society.

The reading of a paper, entitled "Experimental Researches in Electricity, 16th Series." By Michael Faraday, Esq., D.C.L., F.R.S., &c., was resumed and concluded. On the source of power in the Voltaic pile.

The determination of the real source of electrical power in galvanic combinations has become, in the present state of our knowledge of electricity, a question of considerable importance, and one which must have great influence on the future progress of that science. The various opinions which have been entertained by philosophers on this subject may be classed generally under two heads; namely, those which assign as the origin of voltaic power the simple contact of dissimilar substances, and more especially of different metals; and secondly, those which ascribe this force to the exertion of chemical affinities. The first, or the theory of contact, was devised by Volta, the great discoverer of the Voltaic pile; and adopted, since it was promulgated by him, by a host of subsequent philosophers, among the most celebrated of whom may be ranked Pfaff, Marianini, Fichner, Zamboni, Matteucci, Karsten, Bruchardat, and also Davy; all of them bright stars in the exalted galaxy of science.

The theory of chemical action was first advanced by Fabroni, Wollaston, and Parret; and has been since farther developed by Oersted, Becquerel, De la Rive, Ritchie, Pouillet, Schonbein, and others. The author of the present paper, having examined this question by the evidence afforded by the results of definite electro-chemical action, soon acquired the conviction of the truth of the latter of these theories, and has expressed this opinion in his paper, published in the Philosophical Transactions for 1834.

The author, after stating the fundamental doctrine laid down by Volta, proceeds to give an account of various modifications in the theory introduced by subsequent philosophers; and also of different variations in the views of those who, in the main, have adopted the chemical theory. Being desirous of collecting further and more decisive evidences on this important subject, he engaged in the series of experimental researches which are detailed in the present memoir.

It is assumed, he observes, by the advocates of the contact theory, that although the metals exert powerful electromotive forces at their points of mutual contact, yet in every complete metallic circuit, whatever be the order or arrangement of the metals which compose it, these forces are so exactly balanced as to prevent the existence of any current; but that, on the other hand, fluid conductors, or electrolytes, either exert no electromotive force at their place of contact with the metals, or, if they do exert such a power, the forces called into play in the complete circuit are not subject to the same law of compensation as obtains with circuits wholly composed of metallic bodies. The author successfully combats this doctrine, by bringing forward a great number of instances, where certain fluids, which have no chemical action on the metals with which they were associated in the circuit, are in themselves such good conductors of electricity, as to render evident any current which could have arisen from the contact of the metals, either with each other or with the fluid; the evidence of their possessing this conducting power being their capability of transmitting a feeble thermo-electric current from a pair of plates of antimony and bismuth. The following he found to be fluids possessing this property in a high degree; namely, a solution of sulphuret of potassium, yellow anhydrous nitrous acid mixed with nearly an equal volume of water, very strong red nitric acid, and a mixture of one volume of strong acid with two volumes of water. By employing the solution of sulphuret of potassium as an electrolyte of good conducting power, but chemically inactive with reference to either iron or potassium; and associating it with these metals in a circuit, formed by two test-glasses containing the solution, into one of which was immersed a plate of platina and a plate of iron, and in the other two plates of platina; and the circuit being completed by wires of the same metals respectively, joining the iron-plate in the first glass with one of the platina-plates in the second, while the other two platina-plates were united by platina wires, interrupted at one part by a short iron wire which joined their ends;—it was found by the test of an interposed galvanometer, that, as no chemical action took place, so no electric current was produced; yet the apparatus thus arranged could transmit a very feeble thermo-electric current, excited by slightly raising the temperature of the wires at either of their points of contact. Hence, the inference may be drawn, that the contact of iron and platinum is of itself productive of no electromotive force. On the other hand, the author shows, that the interposition in the circuit of the smallest quantity of an electrolyte, which acts chemically on either of the metals, the arrangement remaining in all other respects the same, is immediately attended with the circulation of an electrical current far more powerful than the thermo-electric current above-mentioned. A great number of combinations of other metals were successively tried in various ways, and they uniformly gave the same results as that of iron and platina. Similar experiments were then made with various metallic compounds, and also with other chemical agents; and in all cases the same general fact was observed; namely, that when no chemical action took place, no electrical current was excited; thus furnishing, in the opinion of the author, unanswerable arguments against the truth of the theory of contact. The only way in which it is possible to explain these phenomena on that theory, would be by assuming, that the same law of compensation as to electro-motive power is observed by the sulphuret of potassium, and the other fluids of corresponding properties, as obtains in the case of the metals, although that law does not apply to the generality of chemical agents; and in like manner, different assumptions must be made in order to suit the result in each particular combination, and this without any definite relation to the chemical character of the substances themselves; assumptions, which no ingenuity could ever render consistent with one another. At the conclusion of the paper, the author describes some remarkable alternations in the phenomena which occur, when pieces of copper and silver, or two pieces of copper, or two of silver, form a circle with the yellow sulphuretted solution; and which lead to the same conclusion as the former experiments. If the metals be copper and silver, the copper is at first positive, and the silver remains untarnished; in a short time the action ceases, and the silver becomes positive, at the same time combining with sulphur, and becoming coated with sulphuret of silver; in the course of a few minutes, the copper again becomes positive; and thus the action changes from one side to the other in succession, and is accompanied by a corresponding alternation of the electric current.

February 20, 1840.

The MARQUIS of NORTHAMPTON, President, in the Chair.

John Caldecott, Esq., was balloted for, and duly elected into the Society.

A paper was read, entitled "On the Wet Summer of 1839." By Luke Howard, Esq. F.R.S. &c.

The observations of the author were made at Ackworth, in Yorkshire; and the following are his results with regard to the mean temperature and the depth of rain, in each month, during 1839.

	Mean Temp. °	Rain. in inches.		Mean Temp. °	Rain. in inches.
Jan.	37·04	1·13	July	59·30	5·13
Feb.	39·64	2·14	Aug.	58·09	2·94
March	39·08	3·21	Sept.	54·49	3·43
April	44·09	0·58	Oct.	48·39	3·40
May	49·94	0·38	Nov.	43·14	4·54
June	56·35	4·89	Dec.	37·29	1·85

Mean temperature of the year 47·24°.

Total depth of rain in 1839, 33·62 inches.

He states that the climatic mean temperature of the place is about 47°, and the mean annual depth of rain about 26 inches. The excess of rain during the year 1839 was therefore very great.

The author describes the effect of the hurricane of the 7th of January, and follows the changes of the weather during the remainder of the year.

A paper was also in part read, entitled "On the chemical Action of the Rays of the Solar Spectrum on preparations of Silver and other substances, both metallic and non-metallic, and on some photographic processes." By Sir John F. W. Herschel, Bart. V.P.R.S. &c.

The President informed the Meeting that the Council had voted the following Address of Congratulation to Her Majesty, the Queen, on the occasion of Her marriage, and that he had presented it at the Levee yesterday.

"*To the Queen's Most Excellent Majesty.*

"The humble Address of the President, Council, and Fellows of the Royal Society of London for improving Natural Knowledge.

"Most Gracious Sovereign,

"We, Your Majesty's most dutiful and loyal subjects, the President, Council, and Fellows of the Royal Society of London for improving Natural Knowledge, beg leave to approach your sacred person, and to offer most humbly to Your Majesty our sincere and heartfelt congratulations on the present joyful occasion of the marriage of Your Majesty with His Royal Highness Prince Albert of Saxe-Coburg and Gotha; an event, which, in unison with all loyal subjects throughout Your Majesty's dominions, we cordially hail as the auspicious omen of lasting happiness to Your Majesty, and of permanent blessings to the British Empire. We venture to hope, that, amidst the universal felicitations of a free, affectionate, and grateful people, Your Majesty will condescend favourably to receive this tribute of the deep respect and devoted attachment of the Members of our Society; a Society which, under the fostering protection of the successive Sovereigns of these realms during a period of nearly two centuries, has exerted itself to extend the boundaries of scientific knowledge, and of those arts which augment the power and ameliorate the condition of the human race; objects to which Your Majesty, following the steps of Your Illustrious Predecessors, has already been graciously pleased to extend Your Royal patronage and encouragement.

"That Your Majesty's reign may be long, happy, and glorious, and that it may be especially distinguished in the annals of history as the pacific era in which the greatest advances were made in Science, Literature, and the useful Arts, and in which the deep foundations of prosperity to this great empire, and of improvement in the condition of mankind, were consolidated, is the earnest wish and fervent prayer of the President, Council, and Fellows of the Royal Society of London."

The President also stated to the Meeting, that the Council had adopted the following Address of Congratulation to His Royal Highness Prince Albert, of Saxe Coburg and Gotha.

"*To His Royal Highness Prince Albert of Saxe-Coburg and Gotha.*

"The humble Address of the President, Council, and Fellows of the Royal Society of London for improving Natural Knowledge.

"May it please Your Royal Highness,

"We, the President, Council, and Fellows of the Royal Society of London for improving Natural Knowledge, beg leave humbly to present to Your Royal Highness our sincere and most cordial congratulations on the happy occasion of Your Royal Highness's marriage with Her Majesty, the Queen of these realms; an event which, from the known virtues and high endowments of Your Royal Highness, we confidently anticipate will prove the abundant source of domestic happiness to Her Majesty and to Your Royal Highness, as well as of important advantage to the interests of this great and united empire.

"The Royal Society, more especially, has reason to rejoice in beholding the exalted station now occupied by Your Royal Highness, filled by an enlightened and liberal Prince early imbued with the principles of virtue and religion, and whose mind, already expanded, invigorated, and refined by the assiduous cultivation of literature, science, and philosophy, is qualified justly to appreciate the importance to mankind of those pursuits to which the Royal Society has directed its constant attention.

"That Your Royal Highness may, under the blessing of Providence, long enjoy every happiness, is the ardent wish and prayer of Your Royal Highness's humble and devoted servants, the President, Council, and Fellows of the Royal Society of London."